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ABSTRACT

In this study, students who registered for a course at the Open University of Israel could choose the tutorial method they preferred: group face-to-face tutorials with a local tutor in their residential vicinity; tutorials via satellite broadcasting to groups of students around the country; or getting the same satellite tutorial at home on the computer screen. The three groups of students differed in percentages of males and females, age, computer experience, English knowledge, and number of University credits. Satellite classroom tutorials were the least preferred method regarding most of the dimensions about which students were questioned. Satellite home tutorials were preferable because they allow higher concentration, ease of summarizing, more enjoyment, and a higher degree of comprehension of the material. The paper concludes with a number of pedagogical and methodological implications regarding research on educational technologies. (Author/AEF)

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Satellite Home Tutorials vs. Satellite Classroom Tutorials

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Abstract: In the present study students who registered for a course at the Open University of Israel could choose the tutorial method they preferred: group face-to-face tutorials with a local tutor in their residential vicinity, tutorials via satellite broadcasting to groups of students around the country, or getting the same satellite tutorial at home on the computer screen. The three groups of students differed in percent of males, age, computer experience, English knowledge, and number of university credits. Satellite classroom tutorials were the least preferred method regarding most dimensions students were questioned about. Satellite home tutorials were preferable because they allow higher concentration, ease of summarizing, more enjoyment and a higher degree of comprehension of the material. The paper concludes with a number of pedagogical and methodological implications regarding research on educational technologies.

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Background

Teaching and learning at the Open University of Israel (OUI) are based mainly on textbooks written especially for distance learning. In addition to this written element the component of interaction between students and the teaching staff is essential. In order to remain faithful to the distance teaching emblem and avoid obligating the student to travel to the University campus, this interaction takes place at learning centers distributed throughout the country. Most of the OUI courses offer the students meetings once a week (IT-Intensive Tutoring) or once every three weeks (RT-Regular tutoring), at learning centers in their residential vicinities, conducted by a local tutor.

Indeed, meetings with tutors at learning centers bring the University closer to the students (who can participate in tutorials near their homes). However, these tutorials are not an ideal solution. It is not always possible to find enough expert tutors for all groups of students, there are not always enough registered students in each region to justify opening a group and recruiting a tutor, and this is surely not a solution for those students who cannot leave their homes for one reason or another (temporarily due to childbirth for example, or permanently because of disability).

One of the solutions for these difficulties is making the meeting an asynchronous virtual one through discussion groups on the Internet. Today, the students of the OUI can carry out asynchronous interaction with the University staff by means of an Internet Hebrew study environment, which was developed by the University. Nonetheless, this solution does not respond to the need of most students for synchronic instruction in which there is direct and synchronic contact between the tutor and the students and among the students themselves.

Another solution has been implemented at the OUI, over the last five years in cooperation with Gilat Company. There are two studios operating at the University's central building from which lessons are broadcast, through satellite media, to classrooms throughout the county. This system, designated for synchronous teaching, enables tutors to conduct tutorials and review lessons, experts to give lectures and so forth. The communication between the lecturer and the students is visual, audio and data based. The visual communication is uni-directional, only from the studio to the classrooms. Though the lecturer is seen and heard in all of the classrooms on a TV screen, he can not see the students. The satellite communication is based on a wide broadband. Thus, the lecturer is able to integrate films, presentations, Internet pictures, etc. in the lectures. Audio information is bi-directional (from the studio to the classrooms and from the classrooms to other classrooms and to the studio). The lecturer and the other students can hear the voice of each student that has been given the floor by the lecturer. With respect to data communication, the lecturer can present multiple choice questions to the students, ask them to answer the questions by pressing an appropriate button on the satellite phone, and immediately present the distribution of answers to the students. This teaching system solves the first problem stated above regarding the tutorials at the study centers throughout the country – all students study with the best tutor and are exposed to professional and quality teaching.

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This system does not provide a solution for the students who do not reside near centers with classrooms receiving satellite transmission nor for those who are unable to leave their homes. Furthermore, in accordance with the OUI's goal to enable flexibility in study methods and adapt the methods to the learning style of the student, and its belief in student autonomy, students should be allowed to choose the most suitable learning method: to study from home, to study at a study center, to receive abundant tutoring (intensive), a little tutoring (regular) or none at all, to receive face-to-face tutorials (synchronized, at the time and place determined for the student), virtual instruction (synchronized, from afar, at home or in a classroom that receives satellite transmission) or computer-mediated asynchronous tutoring (through the computer and the Internet at a place and time convenient for the student).

The present study was designated to examine the possibility of providing solutions to those students who wish to receive synchronized tutorials but are unable to leave their homes, or prefer to be instructed at home rather than in the classroom. The solution examined was transmission of tutorials from the studio through satellite broadcasting concurrently to classrooms distributed throughout the country and to the homes of students who requested this study method. The aims of the study were:
1. To examine the technical feasibility of transmitting satellite tutorials concurrently to homes and to classrooms.
2. To examine whether students interested in RT at home differ from those interested in RT in classrooms. Consistent with past research, we hypothesized demographic and achievement differences in preferences of learning environments (e.g. Beyth-Marom et al., 2000; Rosen, Sears, & Weil, 1987; Yaghi & Abu-Saba, 1998).
3. To study the opinions of the classroom students and home students regarding the technical, pedagogical and social aspects of the satellite learning environment.
4. To examine whether tutor-students interaction patterns of students at home differ from those in classrooms.

The present paper will present some of the data concerning aims 2 & 3 and discuss their implications.

Method

The course "Mass Communication" was chosen as a platform for the experiment (delivering satellite tutorials concurrently to classes and to students' homes) since it already had an Internet home site, regular satellite tutorials transmitted to classrooms and its tutor had previously gained technological experience. Cost considerations (loaning the equipment by the students and its installation at their homes) determined the number of home students – between 15 and 20.

Six hundred and twenty four students registered for the course. 555 of them registered for classroom, face-to-face, IT (Intensive Tutoring) and 69 registered for RT (Regular Tutoring). IT is given once a week to groups of students, in study centers, by several tutors. RT is delivered once in two to three weeks to classrooms through satellite communication, by one tutor. The students who registered for RT were sent a letter inviting them to take part in an experiment in which they would participate in tutorials transmitted by the satellite system to their home computers.

Eventually, 16 students volunteered for the experiment, of which only 10 were connected during the second month of the semester. All other RT students (59) got the satellite RT in special classes located at study centers around the country. 555 students received face-to-face IT in conventional classes in the same study centers. Thus, the study involved three groups of students though the first two were the main focus of the study.

Various sources provided information for the diverse goals of the experiment. We will mention here only those relevant to the present report. Information on the participants' characteristics (for the three groups of students) was received from the University's central database. The variables examined for each participant are listed in Table 1. Feedback from students on technical, pedagogical and social aspects of the learning environment they experienced was collected by questionnaires which were sent to the students studying through the satellite system (at home or in the classroom) immediately upon completion of the experiment. The 53 students who registered for RT and didn't volunteer to study at home received a questionnaire regarding their experience with the satellite system. The ten home-students received a similar questionnaire (as they had an experience with the satellite class system

before the home-system was installed) and additional questions regarding their experience with the system at home.

Results

Characteristics of Students in Various Types of Tutorial Groups

Table 1 summarizes the data collected about students' characteristics. Columns 2 and 3 compare the satellite home students to the satellite classroom students and columns 4 and 5 compare the satellite students who participated in regular tutorials (at home and in the classroom) to those who participated in face-to-face IT. The numbers in bold signify the differences.

Table 1: Summary of Students' Characteristics in the Three Different Tutorial Groups

1. Variable	Regular Tutorials		4. Intensive Tutorials (f2f) (N=555)	5. Regular Satellite Tutorials (N=69)	6. Total (N=624)
	2. Satellite at Home (N=10)	3. Satellite in the Classroom (N=59)			
Percentage of males	20.0	**40.7**	23.6	37.7**	25.2
Age: average	**30.6**	28.8	28.7	**29.0**	28.7
Percentage up to 20	0.0	**5.1**	0.5	**4.3**	1.0
Percentage between 20 and 30	**80.0**	72.9	**77.4**	73.9	77.0
Percentage above 30	20.0	22.0	22.1	21.7	22.0
Percentage on a Moshav, Kibbutz, rural settlement	11.1	**14.0**	8.2	**13.6**	8.8
Percentage with matriculation certification	70.0	**79.7**	76.6	**78.3**	76.8
Average credit points	**45.6**	39.2	24.8	**40.2***	26.5
Number of courses	**11.0**	9.2	5.7	**9.5***	6.1
Average grade towards the degree (until the present course)	72.0	**74.0**	**74.9***	73.6	74.7
Grade of present course	71.3	**74.1**	**77.6**	73.9	
Percentage that studied computer applications	**30.0**	16.9	9.7	**18.8****	10.7
Percentage that studied statistics or mathematics	50.0	**54.2**	45.0	**53.6**	46.0
Percentage of students with experience in learning through the satellite system.	**40.0**	20.3	5.0	**23.2****	7.1
Percentage that completed English requirements	**40.0**	40.7	20.4	**40.6****	22.6

* Significant difference according to the t-test.

** Significant difference according to the Fischer test.

As the group that studied at home was a very small group, any conclusion derived from its findings can only constitute an assumption for future research. We will therefore only compare the entire group of students who participated in the RT through the satellite system (at home and in classrooms) with the face-to-face IT group (comparison of columns 4 and 5).

The results were similar to those revealed by a previous study (Beyth-Marom et al., 2000) on students choosing computer-mediated technology: the students studying in the regular tutorials (and in the present case those studying through satellite technology) are more veteran students, a greater number of them completed their English requirements, completed a course in Math or Statistics and completed the computers application course. There are also more male students in this group. However, unlike the findings of the previous study (on computer-mediated learning) those who chose RT by satellite are not

necessarily better students (as evident in their average grades towards their degree and in the grade of the present course).

Since in the present experiment all the students who chose the regular tutorials studied through satellite (at home or in the classroom), and all those who chose intensive tutorials studied through the face-to-face method, it is impossible to know which variable is responsible for the differences in the characteristics of the two groups. More pedagogical and methodological implications regarding these group differences will be discussed in the last part of the paper.

Students' Opinions regarding Satellite Tutorials

Nineteen of the students in the classroom satellite RT filled in the questionnaires that were sent to them. 15 of those attended at least one tutorial. Four of the students that studied at home also answered questions regarding satellite classroom tutorials in which they took part before they were connected from home. Their data was not included because of their small number. Nine of the ten participants in satellite home tutorials filled in their questionnaire. In the questionnaires students were asked many questions to meet all research aims. We will report only about their opinions regarding the different types of tutorials.

The classroom students were asked to respond to the following statement: "Below are two types of tutorials with which you are acquainted: face-to-face tutorials and satellite classroom tutorials. On the assumption that the same tutor teaches the tutorials, mark with an ✗under the method that you believe is the best way of learning with respect to the dimensions below." The home students were asked to respond to the same statement but with regard to three types of tutorials: face-to-face classroom tutorials, satellite classroom tutorials and satellite home tutorials. Table 2 presents the distribution of responses in both groups.

Table 2: Percent of students who chose each type of tutorial for classroom students (columns 1 & 2) and home students (columns 3, 4 & 5).

Variable	Classroom Students		Home Students		
	Face-to-Face classroom tutorials – 1	Satellite classroom tutorials –2	Face-to-face classroom tutorials –3	Satellite classroom tutorials – 4	Satellite home tutorials – 5
I understand the tutor better	**81.2**	12.5	**37.5**	12.5	25.0
I concentrate better	**72.2**	22.2	22.2	11.1	**55.5**
It is easier for me to summarize the tutorial	**67.7**	33.3	11.1	11.1	**55.5**
I ask more questions	**100.0**	0.0	**88.9**	0.0	0.0
I answer more questions	**94.1**	5.9	**55.5**	11.1	22.2
I enjoy the lesson more	**80.0**	20.0	11.1	11.1	**55.5**
I understand the material better	**75.0**	25.0	22.2	11.1	**44.4**
The tutor's talk is more comprehensible to me	**60.0**	33.3	33.3	11.1	33.3
The questions I ask get more responses	**50.0**	40.0	22.2	**33.3**	22.2
I feel that I have better control of the situation	**64.7**	29.4	44.4	11.1	44.4
I feel more obligated to attend the tutorial	**78.6**	14.3	11.1	0.0	**55.5**
I prepare myself better for the tutorial	**72.7**	27.2	**50.0**	0.0	16.7

The comparison between the face-to-face classroom tutorials and satellite classroom virtual tutorials done by the classroom students revealed that face-to-face tutorials were considered to be advantageous

with respect to all the cognitive and affective dimensions that the satellite classroom students were asked about.

For the home students who compared the three methods, the satellite classroom remained the least preferred method with respect to all the dimensions (except – "questions I ask get more responses"). However, the results of the comparison between face-to-face classroom tutorials and satellite home tutorials were very interesting: Home students believe that satellite home tutorials are preferable because it is easier to concentrate, to summarize and understand the material, as well as being more enjoyable. However, they have the feeling that they ask more questions in face-to-face classroom tutorials in comparison to home tutorials. In contrast to the satellite classroom group, half of the home students felt that they have good control of the situation, more than in face-to-face or satellite classroom tutorials.

A comparison between the choices of the two groups raises doubts concerning a number of traditional claims regarding satellite tutorials (e.g., it creates a feeling of anonymity and of no control) and shows again that students differ in their preferred learning methods.

Discussion and Conclusions

In the present study an attempt was made to examine a number of pedagogical, methodological and technological issues in the process of launching a new learning technology. In this section we will summarize the main findings and conclusions concerning the pedagogical and methodological issues.

Pedagogical Issues

An examination of the **characteristics of the three groups** of students: those who volunteered for the satellite home experiment, those who chose regular satellite classroom tutorials and all the other students who chose intensive face-to-face tutorials, revealed that each group had unique characteristics.

The group of students studying at home was older and included more veteran students, had more experience with computers and had more experience studying in satellite classrooms in comparison with the satellite classroom students and in comparison with the face-to-face tutorial students. A larger percentage of the students studying at home had an exemption in English. These distinctions are maintained when combining the satellite home students and the satellite classroom students into one group for comparison with the group of students studying intensive face-to-face tutorials.

Since the groups differ not only in the technology but also in the frequency of tutorials – the question arose as to whether the factor distinguishing between the groups was the preference of the technology or the preference of a certain number of tutorial meetings. Only a future examination of the unique differences between students who choose face-to-face regular tutorials and those who choose face-to-face intensive tutorials will provide an answer to this question.

When comparing only face-to-face tutorials to satellite classroom virtual tutorials the later are considered inferior with respect to all the cognitive and affective dimensions about which the satellite classroom students were asked. Satellite classroom tutorials remained the least preferred method regarding most measures also when face-to-face tutorials, satellite classroom tutorials and satellite home tutorials were compared. However, when satellite home tutorials and face-to-face tutorials were compared an interesting finding was revealed: the satellite home tutorial students believe that satellite home tutorials are preferable because they allow higher concentration, ease of summarizing, more enjoyment and a higher degree of comprehension of the material. They also had the feeling that they asked more and received more responses in face-to-face tutorials than in satellite home tutorials. In contrast to the satellite classroom students, half of the satellite home tutorial respondents believe that from home they have good control of the situation, more than in face-to-face classroom tutorials or satellite classroom tutorials.

The responses of the students to the comparison of the various types of tutorials may indicate that in the perception of most students, face-to-face classroom tutorials are the preferred type. If one must compromise on a technology (for various reasons), it is preferable that it reaches the student's home. In a comparison between satellite home tutorials and satellite classroom tutorials, it seems there is no advantage to satellite classroom tutorials. A student who seeks for a peer group of learners prefers the social interaction of a face-to-face tutorial over that in a satellite classroom tutorial.

Students' preferences and their responses, as well as their different characterizations highlight, more than anything else, the individual differences between them. Different students prefer different styles of learning and have different needs, which determine their preferences. If we wish to respond to needs and preferences, it is impossible to search for the best method, but rather to offer the student a variety of methods to choose from.

Methodological Issues

The present experiment raised interesting methodological issues common to many studies on educational technologies. Below are a number of them:

1. The main limitation of many of these studies is their poor design (The Institute for Higher Education Policy, 1999). Very often a comparison is made between two groups which differ in a number of variables, in addition to the one independent variable studied. Such poor design doesn't allow for valid conclusions.

In comparisons between different technologies usually there is no meticulousness regarding intervening variables such as different lecturers, different learning materials, different examinations and different students. As long as the study does not control for such variables, it is impossible to interpret the results. In comparing the two satellite groups (classroom vs. home) in the present experiment, attention was paid to controlling for a number of variables: a. for the kind of material (by ensuring similar tutorials to the two satellite groups- at home and in the classrooms); b. for tutor (by ensuring the same tutor to the two groups) and c. for time (by having the tutorials at the same time in both groups). The groups differed only in the technology (the independent variable that was the focus of the study), as well as students' characteristics.

In a comparison between the satellite tutorial groups (at home and in the classroom) and the face-to-face tutorial group, an additional intervening variable could not be excluded, namely, the frequency of the tutorials. This variable should be controlled for in future studies.

2. A field-study on learning technologies that involves technical, pedagogical, affective and cognitive behavioral aspects requires a multi-operational approach – examining each theoretical variable with various measurement tools in order to guarantee independence between the method of measurement and the findings. This approach was taken in the present study with regard to variables not mentioned in the present report (e.g. Self report on the frequency of the interaction and its efficacy together with the observation and listing of the same interactions).

3. The inclusion of volunteers in an experiment may cause problems which become even more serious when one compares two groups of which only one involves volunteers (Rosenthal & Rosnow, 1969). In this type of experiment three difficulties exist:

a. Volunteers for experiments are substantially different from those who do not volunteer, and thus the two groups are different in regard to variables other than the independent variable under study. The examination of these variables, done in this experiment, is a partial solution. Such examination might reveal differences that may shed more light on the findings.

b. The volunteers in an experiment have a great commitment to it. The relatively high satisfaction with the satellite home communication system may stem from pertinent reasons ("the tool is wonderful and has many possibilities that only technical reasons prevent their full realization at present"). But this satisfaction may also express a type of justification for volunteering, post factum.

c. Volunteers for technological experiments usually receive special treatment. They are in frequent contact with the technical support team (because of technical failures), and with the course team (because of their small number and special problems). Satisfaction with these special treatments may cause some halo-effect and influence the general satisfaction with the experiment and with other aspects of the learning environment.

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